

How predictable is crime?

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It's much more predictable than people think it is. Victims of crime often feel like the crime has come out of the blue. If you're robbed at gunpoint on the street, it feels like a random event. It turns out that crime has patterns: collections of where and when crimes occur, and maybe some of the whys, are quite regular. How predictable crime is varies from crime type to crime type and location to location. There always is a fair amount of noise in crime data, but the prediction problem is quite tractable.

When you look at the ethnography of crime, there's always an individual story that goes along with an individual offender or an individual victim. But when you take a step back from individual stories, there are a lot of things that occur in common. No matter where you go, Europe or Asia or North America, if you ask burglars, "why do you break into these houses?" they'll give you lots of answers that point to a generalization: "I broke into that house because it was easy. And here's why it was easy."

They report the same sorts of reasons for committing the crimes where they do and when they do. As an anthropologist by training, I'd say there's a really good reason for that: we are evolved to solve foraging problems, and many offenders are just applying those things that come naturally to people.

We can say a lot about how far people are willing to travel to commit crimes. It turns out to be not very far at all. Most offenders commit crimes very close to where they work, where they live, where their girlfriend or boyfriend lives, or the anchor point for their activity. That's pretty much universal, and there are good ecological reasons for it. I would imagine there are policy implications for that, be it policing strategy and tactics or urban development and design. Those sorts of things are universal.

-Dr. Jeffrey Brantingham
Chief of Research and Development at PredPol

How do you show that prevented crime isn't being just pushed into other neighborhoods?

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That is what's called "displacement," and it's been a hot topic in criminality for decades. All of the experiments that have been done on displacement have pointed to a conclusion that is incomplete. For some offenders, if you take away their preferred location, they will desist for a time. In the time that they are desisting, you will get fewer crimes.

Now, there is a key distinction here: the difference between preventing crime and preventing criminality. If you take someone that has a serious drug dependency and they are committing property crimes for the purpose of supporting their drug habit, preventing them from committing a crime today is a benefit to the community because you have one less crime today. But in so doing, you haven't solved the problem of that person's drug dependency. That is a completely separate issue. And completely different issues are needed for that problem.

What we've been working on is about preventing crime, rather than criminality. Preventing criminality is potentially a much harder problem. Criminality is multi-causal—there are lots of reasons why someone is willing to commit crimes in the first place. One of the big challenges is that criminality is something that occurs over a lifetime. So with a lot of policy ideas, if they get put into place, you're not going to know how they work for 8, 10, or 15 years. That's a huge challenge.

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There's no easy solution to that problem. That's not what we're working on. We're not about preventing criminality; we're about disrupting opportunities for crime in the here and now.

-Dr. Jeffrey Brantingham
Chief of Research and Development at PredPol

How are boxes chosen?

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PredPol is based on nearly seven years of detailed academic research into the causes of crime pattern formation. That research successfully linked several key aspects of offender behavior to a mathematical structure that is used to predict how crime patterns will evolve from day-to-day, from moment-to-moment.

PredPol's boxes are chosen using only the what, when, and where of incidents that have already occurred in your city. We take anywhere from 3-10 years of crime data and run the relevant points of information through our algorithm. Long and short term trends, recurring events, and environmental factors are all taken into account.

The mathematics looks complicated—and it is complicated for normal mortal humans—but the behaviors upon which the math is based are very understandable. There are really three aspects of offender behavior that make their way into the mathematical model.

1. Repeat victimization, which describes—taking burglary as an example—that if your house is broken into today, the risk that it is broken into tomorrow actually goes up. This is because it is 'smart' for offenders to return to the exact places where they have been successful before. Why go to some other unknown house where you don't know if the house is empty of people, you don't really know how hard it is to break in, and you don't know what there is to be stolen. The house you broke into two or three days ago is much less risky.
2. Near-repeat victimization, which recognizes that not only is your own house at greater risk of being broken into again, but your neighbor's house is also at greater risk. Your neighbor is a lot like you, they have similar socio-economic status, work similar hours, have a house a lot like yours and are going to have much the same stuff to steal. The offending 'script' the offender used to break into your house maps to your neighbor's house almost perfectly.
3. Local search, ties it all together. We know that offenders rarely travel very far from their key activity points such as their home, work and play locations, meaning that crimes tend to cluster together.

Why do you include many years of crime history?

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Why does PredPol include up to ten years of crime history data in their predictions? Are we chasing years-old crime? As offenders typically move around often, how can we keep track of what crimes they are committing?

PredPol was developed in conjunction with police, but more importantly PredPol is in no way meant to be a replacement for the knowledge, skills, experience or training of the officer. PredPol says nothing about tactics, it only provides information about where and when crime is most likely to occur.

There are really three different ways to answer the concerns. First, we know that predictions get more accurate the more years of data that you add in. This is simply what the evidence says. If 6-24 months offered a better basis for prediction we would use that, but the data suggests that it doesn't. Our goal is to give you the best possible



information about where and when crime is most likely to occur.

Second, even though we include a long time horizon of data in the analysis, PredPol does not exclusively look at the long term (10-year) patterns. Rather, what it does is figure out the relative importance of the short-term crimes happening over the past couple of days compared to the the medium and long term patterns happening over months and years. Any officer would probably agree that there are features of the environment that have been crime generators for many years in the past and will continue to be so tomorrow and for years to come. The fact that an offender ran out of money also matters (short term stuff). You need to take both long-term and short term processes into account to generate a prediction of what is likely to happen tomorrow. If you only have the resources to visit one location tomorrow, do you go to the long-term generator or to the site of a cluster of crimes over the past two or three days? The answer is not always the long-term generator or the short-term cluster. Sometimes it is one and sometimes the other. PredPol helps sort this out in a way that humans have a hard time doing.

Third, regarding concerns about turnover in the offender population and whether it is true that the offenders of seven years ago have no bearing on the offenses today. This is true in a sense, but it is equating crime with specific offenders. Any officer would probably agree that an apartment complex that years ago rented places to people who were prone to breaking into houses, stealing cars, dealing drugs, etc., are likely rent to similar (not the same) people today. So, the specific offenders do turn over, but they are replaced by new offenders who continue to cause problems in much the same ways. Even if neighborhoods change, which they do over decades, PredPol picks this up. Ultimately, what PredPol is looking at is the crime events itself and not the offenders. I strongly believe that an intelligence-led approach is an important and essential part of contemporary policing. PredPol is not a replacement for that and in fact is not dependent upon information about specific offenders at all.

What privacy and constitutional concerns do you think policy makers need to take into account as they apply crime prediction?

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Policing and policy have to be developed within the constitutional framework and there will always be limits on what can and cannot be done within the context of law enforcement. A lot of the work we do on prediction is not about predicting who is going to commit a crime, but about where and when crime is likely to occur, regardless of whom the offenders are.

What it's really focused on is disrupting opportunities for crime and preventing crime. Preventing crime benefits everybody. It benefits potential victims because they don't come home and find their car stolen. And although they might not see it this way, it benefits potential offenders. If you've prevented them from committing a crime, that's one less chance for them to run afoul of the legal system, and that does benefit them. It also benefits police because it reduces the amount of time they have to spend processing crime scenes or arresting people and engaged in costly procedures. Crime prevention benefits everybody. I can't see how that wouldn't be an appropriate direction to move. What we're doing is about predicting where and when crime is likely to occur. My understanding is that that information is usable within the context of current policing for police to engage in further investigation. Police always have to have other information and observations at their disposal to engage in police action with people. I think it fits squarely within the legal arguments for hot spot policing. A lot of what we do with predictive policing is just a much more refined approach to hot spot policing. In some ways, you might think of it as being a step in the right direction. It actually defines, in a much more limited and precise way, where law enforcement is needed. This is not so much about moving police from one area of the city to another; it's about saying in a given area, where you have a given amount of resources and a given amount of time, where you should be putting those resources.

-Dr. Jeffrey Brantingham
Chief of Research and Development at PredPol



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